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FORT UNION COAL

CENTER TRACT

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U.S. DEPARTMENT OF THE INTERIOR

BUREAU OF LAND MANAGEMENT

Fort Union Coal Center Tract

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FORT UNION COAL REGION

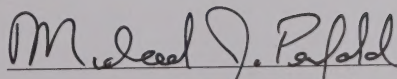
CENTER TRACT ANALYSIS

SITE SPECIFIC ANALYSIS

OLIVER COUNTY, NORTH DAKOTA

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INTRODUCTION

CONTENTS

Site Specific Analysis

Introduction	1
Chapter I — Alternatives	5
Chapter II — Affected Environment	7
Chapter III — Environmental Consequences	19
References	31
Summary Matrix	33
Unsuitability Criteria Results	40

CONTENTS

CONTENTS

Page 1

Page 2

Page 3

Page 4

Page 5

Page 6

Page 7

Page 8

Page 9

Page 10

Page 11

Page 12

Page 13

Page 14

Page 15

Page 16

Page 17

Page 18

Page 19

Page 20

Page 21

Page 22

Page 23

Page 24

INTRODUCTION

The purpose of this action is to consider for leasing the remaining 19.1 million tons of strippable unleased federal coal that would otherwise be bypassed by the existing Center Mine.

This site-specific environmental analysis (SSA) has been prepared for the Center tract (Map 1) in accordance with federal regulations (43 CFR 3420). It will be used by the Fort Union Regional Coal Team to further consider competitive leasing of federal coal within the tract for a June 30, 1983 coal lease sale schedule. If selected and scheduled, the Center tract would make available for leasing about 19.1 million tons of recoverable federal coal.

The effects of mining all coal (federal and non-federal) in the tract are not addressed in this document. Only the effects of leasing and developing the unleased federal coal are considered. The reasons for this approach are as follows:

- 1) The Center Mine, operated by Baukol-Noonan, Inc., is located on this tract and provides coal for the existing Milton R. Young Power Generating Plant.
- 2) Baukol-Noonan, Inc., has 1,489 acres of federal coal under lease on the tract.
- 3) Baukol-Noonan holds several mine plans in the area.
- 4) The unleased federal coal only amounts to about nine percent of the total recoverable reserves in this tract, and covers about 880 acres.
- 5) The Center tract was included in the West-Central North Dakota Regional Environmental Impact Study on Energy Development, completed by the State of North Dakota and the Bureau of Land Management (BLM) in 1978.

The impacts caused by leasing and development of the unleased federal coal are related to the total impacts of mining the tract that have already been determined in previous work.

BACKGROUND

In September of 1980, the Dickinson District Bureau of Land Management (BLM) Office adopted the West-Central North Dakota Management Framework Plan (MFP) for Oliver, Mercer, McLean, Stark, and Dunn counties and a small part of Billings County. The land use planning process included identifying areas of high or moderate potential coal, applying unsuitability criteria, identifying resource trade-offs, and consulting with surface owners. As a result of that work, areas were identified that could be further considered for coal

development. These areas are available for consideration for new competitive leasing, lease exchanges, and lease modifications.

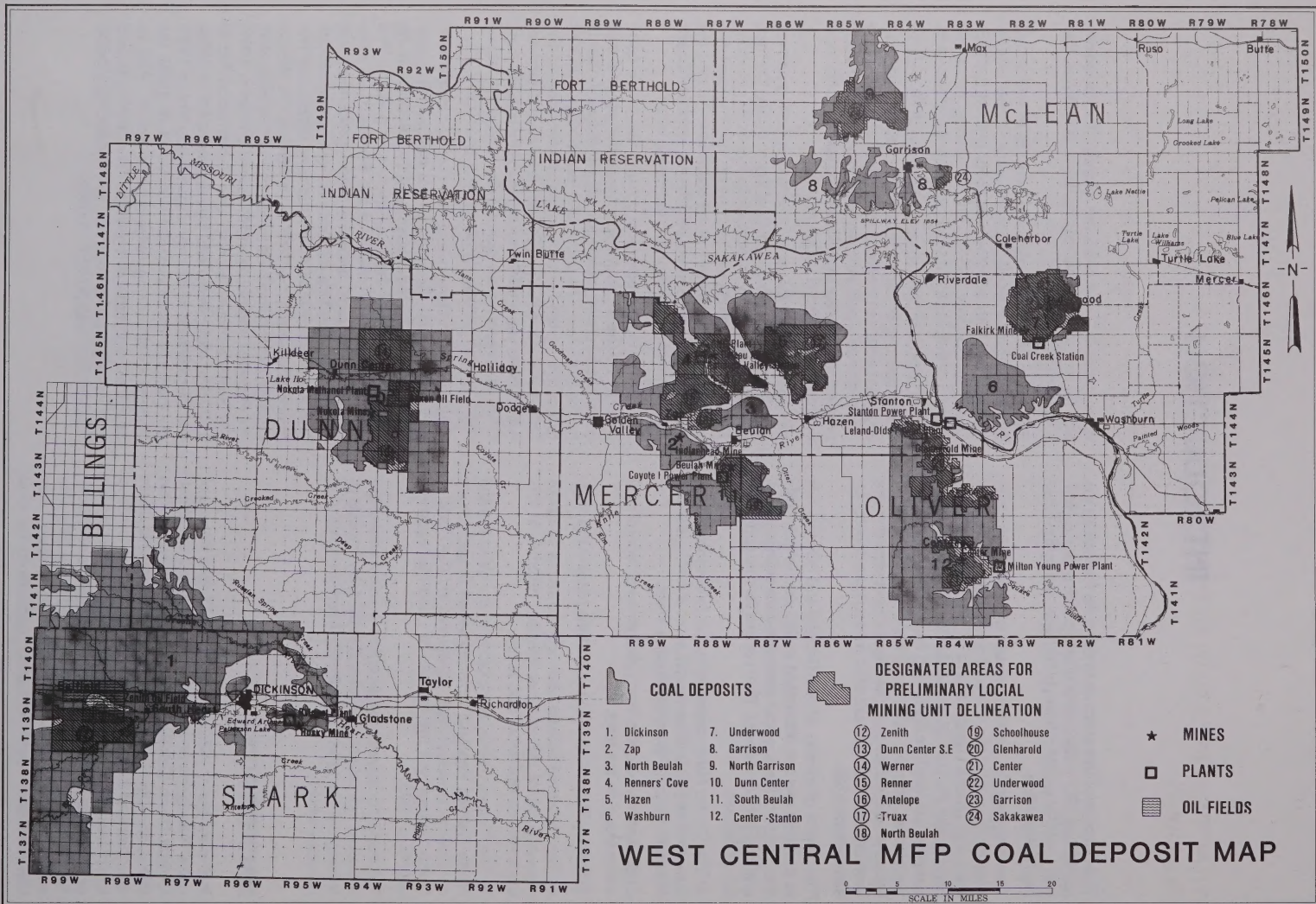
Following land use planning, the BLM requested expressions of interest from industry. These expressions, along with other information, guided the U.S. Geological Survey (USGS) in delineating this tract. Results of that work are summarized in this document.

BLM Dickinson District staff inventoried the tract to determine the site-specific resource values and then analyzed potential environmental effects of coal development on this tract. Among other things, certain of the unsuitability criteria were further considered. Any new findings are reflected in this report.

Information from this and other site-specific analyses will be used by the Regional Coal Team during the tract ranking and selection process for a lease sale schedule. The proposed tracts will be cumulatively analyzed in a regional environmental impact statement. Among the alternatives addressed will be different combinations of tracts that meet a regional coal leasing target.

After reviewing the analytical documents, public comments, and the recommendations of the regional coal team, the Secretary of Interior will select specific tracts for the lease sale. The successful lessee will be required to submit a plan for mining and reclamation to the Office of Surface Mining (OSM) for review and approval within three years after leasing. In evaluating the plan, OSM will prepare a site-specific environmental assessment or environmental impact statement (EIS).

Tracts in the Fort Union Region are being considered in accordance with the federal coal management program adopted by the Secretary of the Interior in June 1979. The basis of the program was, in part, the final environmental statement for the Federal Coal Management Program. Implementation procedures are contained in the Title 43 Code of Federal Regulations Part 3400 (43 CFR 3400). Authorizing actions are The Mineral Leasing Act of 1920, as amended; the Mineral Leasing Act for Acquired Lands of 1947, as amended; the Federal Land Policy and Management Act of 1976; the Surface Mining Control and Reclamation Act of 1977; the Multiple Mineral Development Act of 1954; the Department of Energy Organization Act of 1977; the National Environmental Policy Act of 1969; the Federal Coal Leasing Amendments Act of 1976, as amended; and federal regulations concerning federal coal leasing and development, including 43 CFR 3400, 30 CFR 211, and 30 CFR 700-899.



TRACT DELINEATION REPORT SUMMARY

The Center tract is located in Oliver county, North Dakota. It surrounds the town of Center (Map 1).

The tract is based on the Upper and Lower Hagel beds found in the Tongue River Member of the Fort Union Formation (Paleocene). No geologic hazards are known to exist on this tract.

The Center Mine is located within the tract. There are several mining plans on file. However, these plans do not include all of the currently unleased federal and state coal within the tract.

A possible mining sequence is shown on Map 2. The coal would be mined to a depth of 200 feet or until the limiting stripping ratio of 20:1 has been reached. The most probable end use of the coal would be the Milton R. Young and/or Square Butte power plants.

Specific Tract Characteristics:

Acreage:		
Surface:	Federal	0
	Unleased	0
	State	320
	Private	10,816
	Total:	11,136
Coal:	Federal Leased	1,487
	Federal Unleased	880
	State	1,160
	Private	7,609
	Total	11,136

Coal Reserves/Millions of Tons:

In Place:	Federal Leased	34.3
	Federal Unleased	21.1
	State	27.1
	Private	152.2
	Total	234.7
Recoverable:	Federal Leased	30.9
	Federal Unleased	19.1
	State	24.4
	Private	137.0
	Total:	211.4

Bypassed Federal Coal: 78 acres;
Recoverable Reserves: 1.1 million tons

Coal Quality: Average of samples as received from vicinity of tract:

Moisture	34.8%
Volatile matter	31.5%
Fixed carbon	30.3%
Ash	6.3%
Sulfur	1.0%
BTU's/lb	6,747

Surface Disturbance/acres

Mining: Annual rate, 183; Total Life of Mine, 9,162

Haul Roads: 127

Mine Facilities: Already built

Stripping Ratio: Less than or equal to 20:1

Coal Thickness: Lower Hagel Bed, 7 to 14 feet; Upper Hagel Bed, 5 to 8 feet

Mine Employment: Permanent employees at peak production would number about 80

Royalties and Severance Taxes:

Annual Federal Royalty on currently unleased coal,	\$0.28 million
Annual Federal Royalty on currently leased coal,	\$0.09 million
Annual North Dakota Royalty,	\$0.37 million
Annual North Dakota Severance Tax,	\$3.78 million

Water Needs:

Human Consumption, 5,000 gal./day
Source: Well water

Nonpotable, 60,000 gal./day
Source: Pit dewatering and the power plant's supply

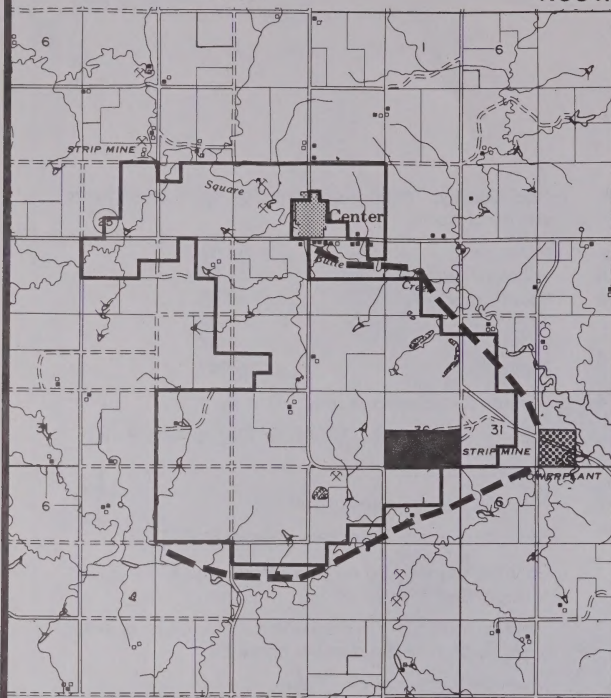
For more specific information on the proposed mining operation, refer to the engineering, geologic, and land reports prepared by the tract delineation team.

NOTE: As the mine plans developed by USGS are of a generic nature and the actual mining sequence will be developed by the mining companies to fit their individual needs, the resource specialist assigned to the SSAs made the assumption that all lands within the tract boundaries would be disturbed to some degree. Therefore, acreage in the SSA may not always agree with that shown in the Tract Delineation Report concerning acreage disturbance.

R84W

R83W

CENTER TRACT



T142N

LEGEND

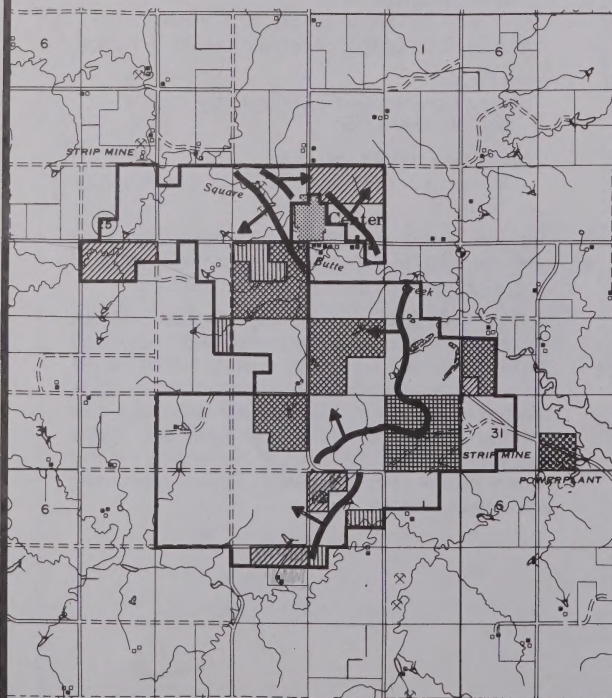
- State Surface
- Private Surface
- Tract Boundary
- Federal Coal
- State Coal
- Private Coal
- State Coal Lease
- Federal Coal Lease
- Surface Facilities
- Out-of-Pit Haul Roads
- Pit Advancement

T141N

SURFACE OWNERSHIP

R84W

R83W



T142N

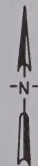
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MAP 2

SUBSURFACE OWNERSHIP



Scale In Miles



CHAPTER I

ALTERNATIVES

LEASING AND DEVELOPMENT

This alternative is to offer for further consideration the unleased federal coal in the Center tract for competitive leasing. This tract has been identified as a logical mining unit for a 4.2 million ton per year surface mine having a 50-year mine life. The Center tract has been delineated within areas designated as acceptable for further consideration in the West-Central North Dakota MFP adopted in September 1980. The tract does not include any lands for which the surface owner has filed a valid refusal to consent (to mining) prior to March 1, 1981. The tract has been fully cleared of unsuitability criteria numbers 1, 2, 4, 5, 6, 7, 8, 10, 11, 12, 13, 16, 17, 18, 19, and 20 as defined in 43 CFR 3461. Criteria 9, 14, and 15 require further study. With the exception of criterion 3, all unsuitability criteria studies will be completed and fully applied before work begins on the final regional environmental impact statement. If not, this tract will be dropped from further consideration. Criterion 3 will be deferred until mining and reclamation plans are submitted to the Office of Surface Mining and North Dakota Public Service Commission for final approval. Current unsuitability concerns are shown on Map 3. The following is a list of unsuitability criteria.

- (1) Federal Land System
- (2) Rights-of-Way and Easements
- (3) Buffer Zones along R/W and Adjacent to Communities and Buildings
- (4) Wilderness Study Areas
- (5) Scenic Areas
- (6) Lands Used for Scientific Studies
- (7) Historic Lands and Sites
- (8) Natural Areas
- (9) Federally Listed Endangered Species
- (10) State Listed Endangered Species
- (11) Bald and Golden Eagle Nests
- (12) Bald and Golden Eagle Roost and Concentration Areas
- (13) Falcon Cliff Nesting Sites
- (14) Migratory Birds
- (15) State Resident Fish and Wildlife
- (16) Floodplains
- (17) Municipal Watersheds
- (18) National Resource Waters
- (19) Alluvial Valley Floors
- (20) State Proposed Criteria

Relationship to Other Developments

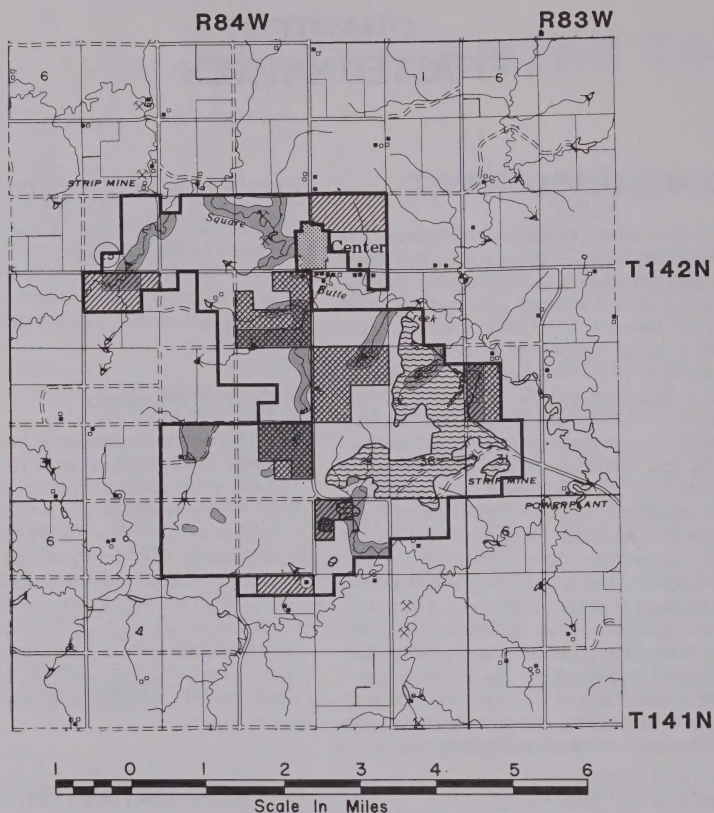
The nearest active mines are Knife River's Beulah Mine 25 miles to the northwest, North American's Indian-head Mine, 31 miles to the northwest, and Consol's Glenharold Mine which is 14 miles north. Farming and ranching are also significant activities in or near the tract.

Mitigation Measures

This alternative assumes that proper mining and reclamation will be carried out according to existing state and federal regulations. These include: Office of Surface Mining Reclamation and Enforcement (OSM) regulations (30 CFR 700-899), Environmental Protection Agency (EPA) regulations (40 CFR 0-1399), Council of Environmental Quality (CEQ) regulations (40 CFR 211), Department of Interior coal management regulations (43 CFR 23 and 3400), and North Dakota Public Service Commission laws and regulations (Chapter 38-14.1 of the North Dakota Century Code and Article 69-05.2 of the North Dakota Administrative Code).

NO LEASING ALTERNATIVE

Federal coal would not be offered for lease under this alternative. The tract contains 19.1 million tons of recoverable unleased federal coal which represents about 9 percent of the total recoverable reserves. It should also be pointed out that the amount of federal coal in the tract is minimal and the individual parcels are scattered. This means that the Center mine or any other mine on this tract could probably operate without the remaining unleased federal coal. If the federal coal is not leased, it would be bypassed and probably never be mined. This alternative would only negatively impact the coal resource and potential state and federal revenues. For other resources the prevailing trends in the environment would continue.

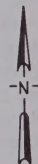


LEGEND

-  Federal Coal
-  Federal Coal Lease
-  Active Strip Mine

Areas being considered as unsuitable by BLM and others
based on existing information.

-  Wildlife Habitat
-  Potential Dwellings



Note: Detailed maps are available for inspection at the Dickinson BLM District Office.
(Rights-of-way too numerous to show.)

CENTER TRACT

CHAPTER II AFFECTED ENVIRONMENT

TOPOGRAPHY

This tract is located in the Missouri slope physiographic area which consists of glacially modified bedrock topography. The area is hilly with a local relief of about 200 feet. There are patches of glacial debris west and south of Center.

GEOLOGY AND MINERALS

The Tongue River member of the Fort Union Formation (Paleocene) is the only exposed bedrock in the tract. The member consists of light buff-yellow, interbedded siltstone, sandstone, and claystone with lignite beds.

The Upper and Lower Hagel beds are the principal lignite resources in the tract and are currently being mined by Baukol-Noonan at the Center Mine. The Lower Hagel ranges in thickness from 7 to 14 feet. A parting of up to 4 feet occurs in the southwest portion of the tract, with a lower bench less than 3 feet thick. The Upper Hagel ranges in thickness from 5 to 8 feet. Interburden between the two beds ranges from 3 to 50 feet thick. Overburden on the Upper Hagel ranges in thickness from 0 to 81 feet.

The tract contains about 9,180 acres underlain by 234.9 million tons of reserve base lignite and approximately 55.5 million tons of federal, 27.8 million tons of state, and 151.6 million tons of private coal.

No oil or gas is produced from this tract but due to its location in the Williston Basin, a very active oil producing region, there is a slight chance of future production.

SOILS AND RECLAMATION POTENTIAL

The soils within operations which include lands over the unleased federal coal in the Center tract have formed in a thin mantle of glacial till, residual shale, siltstone, sandstone, and alluvium. None of these parent materials dominate the landscape, which has led to a variety of soils. The Williams mapping units are the primary ones from glacial till. Regent, Cabba, Belfield, and Sen and Amor mapping units are the primary units from alluvium. Most of these are moderately-deep to deep, well-drained, loamy and fine-loamy soils, of medium to high natural fertility.

Slopes over the parcels involved are mostly gentle to moderate. The water erosion potential is high over

much of the area. Wind erosion is potentially serious primarily on some limited areas of fine sandy loams.

Soil quality is reflected in the reclamation suitability ratings and acreage figures for the SCS Order II county soil survey mapping units in the tract (Tables 1 and 2). Of the 2,713 total acres involved, 1,388 acres (51 percent) is in the "good" category, 976 acres (36 percent) "fair," and 349 acres (13 percent) "poor." Williams and to a lesser extent Arnegard, Sen and Amor, Straw, and Vebar mapping units compose most of the "good" category. Regent, Belfield, Cabba and Morton units make up most of the "fair" class. About 50 of the 349 acres rated "poor" are mine dumps from previous mining activity. The sodic Rhoades soil makes up most of the rest of this category.

The suitability data in Table 2 is developed by surface owners in this analysis report because North Dakota law does not allow the transfer of soil material from one landowner to another unless written consent is given. Each surface owner's land must be reclaimed with soil originally removed from his holdings. The table therefore indicates the degree of difficulty in reclaiming individual landowner holdings based on soil suitability for cover of surface-mined land.

TABLE 2
SUITABILITY OF SOIL FOR RECLAMATION BY
LANDOWNER IN THE CENTER TRACT

-----ACRES-----				
LANDOWNER NUMBER	GOOD	FAIR	POOR	TOTAL
1	82	103	15	200
2	180	179	51	410
4	126	96	58	280
5	320	80	---	400
8	72	18	37	127
9	476	312	148	936
11	78	48	34	160
12	54	140	6	200
TOTAL	1,388	976	349	2,713
% OF TOTAL	51%	36%	13%	100%

1/ Based on Table 1. Planimetry by Bureau of Land Management. Legal description of land and owner name corresponding to landowner number available at Dickinson District Office.

TABLE 1
CENTER TRACT - SOILS

PAGE 1 of 3

Map Symbol and Soil Mapping Unit Name ^{1/}	Percent Slope ^{1/}	Soil Erosion Potential ^{1/} Wind	Water	Overall Suitability of Soil for Use as Cover-Soil Material in Surface-Mine Reclamation ^{2/}	Soil Hazard Conditions ^{2/}
ArA - Arnegard loam	0-3	Low	Low	Good	----
ArB - Arnegard loam	3-6	Low	Low-Mod	Good	----
ArC - Arnegard loam	6-9	Low	High	Good	----
BeB - Belfield-Daglum silty clay loams	3-6	Low	Mod	Fair	Clayey with excess sodium & salts
BdB - Belfield-Daglum silt loams	3-6	Low	Mod	Fair	Clayey with excess sodium & salts
BmB - Belfield-Morton silt loams	3-6	Low	Mod	Fair	Clayey subsoil; Belfield-excess sodium & salts
CbD - Cabba-Werner complex	9-15	Mod	High	Fair	Too alkaline; some lime
CbE - Cabba-Werner complex	15-40	Mod	High	Fair	Too alkaline; some lime
CgE - Cohagen-Sandstone outcrop	15-50	High	High	Poor	Cohagen-too alkaline; sandstone outcrop-lack of soil
ChD - Cohagen-Vebar fine sandy loams	6-30	High	High	Fair	Cohagen-too alkaline
FwA - Flaxton-Williams loams	0-3	Mod	Low	Good	----
FwB - Flaxton-Williams loams	3-6	Mod	Mod	Good	----
FxC - Flaxton-Williams soils	6-9	High	Mod	Good	----
GaA - Gravelly silt loam	0-3	Low	Low	Fair	Clayey subsoil

TABLE
CENTER TRACT - SOILS

PAGE 2 of 3

Map Symbol and Soil Mapping Unit Name ^{1/}	Percent Slope ^{1/}	Soil Erosion Potential ^{1/} Wind	Water	Overall Suitability of Soil for Use as Cover-Soil Material in Surface-Mine Reclamation ^{2/}	Soil Hazard Conditions ^{2/}
GaB - Grail silt loam	3-6	Low	Mod	Fair	Clayey subsoil
GcA - Grail silty clay loam	0-3	Low	Low	Fair	Too clayey
GcB - Grail silty clay loam	3-6	Low	Mod	Fair	Too clayey
LcA - Lawther silty clay	0-3	Mod	Low	Poor	Too clayey
LkA - Lihen fine sandy loam	0-6	High	Low	Good	----
6 Md - Mine dumps	3-50	Highly Variable	High	Poor	Too clayey & alkaline, excess sodium & salts
MoB - Morton silt loam	3-6	Mod	Mod	Fair	Clayey subsoil
MpB - Morton-Daglum silt loam	3-6	Mod	Mod	Fair	Too clayey; Daglum-excess sodium & salts
RgB - Regent silty clay loam	3-6	Low	Mod	Fair	Too clayey
RgC - Regent silty clay loam	6-9	Low	High	Fair	Too clayey
RlB - Regent-Daglum silty clay loam	3-6	Low	Mod	Fair	Too clayey; Daglum-excess sodium & salts
RlC - Regent-Daglum silty clay loam	6-9	Low	High	Fair	Too clayey; Daglum-excess sodium & salts
RoB - Rhoades-Daglum complex	0-9	Low	Mod	Poor	Too clayey; excess sodium & salts

TABLE 1
CENTER TRACT - SOILS

PAGE 3 of 3

Map Symbol and Soil Mapping Unit Name ^{1/}	Percent Slope ^{1/}	Soil Erosion Potential ^{1/} Wind	Water	Overall Suitability of Soil for Use as Cover-Soil Material in Surface-Mine Reclamation ^{2/}	Soil Hazard Conditions ^{2/}
RvE - Ringling gravelly Loam	9-40	Mod	High	Poor	Excess rock fragments
SeC - Sen-Werner loams	3-9	Low-Mod	Mod-High	Good	----
SmB - Sen and Amor loams	3-6	Low-Mod	Mod	Good	----
SmC - Sen and Amor loams	6-9	Low-Mod	High	Good	----
SmD - Sen and Amor loams	9-12	Low-Mod	High	Good	----
SuB - Stady-Lehr loams	3-6	Low	Mod	Good	----
SwA - Straw loam	0-3	Low	High	Good	----
Sx - Straw loam, channeled	0-6	Low	High	Good	----
WlA - Williams loam	0-3	Low	Low	Good	---
WlB - Williams loam	3-6	Low	Mod	Good	----
WlC - Williams loam	6-9	Low	High	Good	----
WzD - Williams-Zahl loams	9-13	Low	High	Good	----
VaC - Vebar fine sandy loam	6-9	High	Mod-High	Good	----
VhD - Vebar-Cohagen fine sandy loams	9-12	High	High	Good	
ZaD - Zahl-Williams loams	9-15	Low	High	Fair	Too clayey; some lime

^{1/} From "Soil Survey of Oliver County, North Dakota"

^{2/} Derived by applying the properties of the soils which are described in the above mentioned soil survey report and "Official Soil Series Descriptions" to the guidelines developed by BLM-Montana State Office and adapted from information by Wm. Schafer, the soil conservation Service (SCS) and the Office of Surface Mining OSM).

HYDROLOGY

Surface runoff from this tract is to Hagel Creek to the south and Square Butte Creek to the north. Square Butte Creek runs through the northern part of the tract around Center. Surface water use within the tract is for wildlife and stockwater purposes.

Groundwater occurs in four major shallow zones. The Kinneman Creek and Hagel Creek lignite beds are aquifers and supply water to wells in this area. A sand zone located below the lower lignite also is an aquifer. The Square Butte Creek Valley was formed by glacio-fluvial action and contains sufficient saturated alluvial fill to be a source of water in the area. The flow system through these aquifers starts as local recharge in the tract area and then generally reflects the topographic control. Both of the lignites outcrop above Hagel Creek and Square Butte Creek. The lower sand zone is directly hydrologically connected to the valley bottom aquifer. Water quality in this system is typically a sodium-bicarbonate-sulfate type. Groundwater use in this area is for domestic stock watering, municipal, and industrial purposes.

VEGETATION AND AGRICULTURAL PRODUCTION

Only operations with land over unleased federal coal within the tract were assessed for this tract, since it has been determined that the leasing or not leasing of federal coal would probably have no effect on the viability of development of this tract.

The Center tract is extensively used for agricultural purposes. Dryland farming methods, most notably alternate year summer fallow-cropping rotations, are widely practiced in the area. Six percent (168 acres, Oliver County ASCS, 1981) is fallow each year (Table 3).

Small grains including spring wheat, oats, corn, barley, flax, and sunflowers (in descending order of acreage grown) are grown on 25 percent (773 acres) of the tract. Wheat yields average 25.4 bushels per acre. Much of the cropland production, especially the wheat portion, is sold as a cash crop. Oats, barley, and corn are also used as feed grains in livestock operations.

Eleven percent (327 acres) of the tract is used for growing hay for use in overwinter livestock feeding. Approximately 1.75 tons of hay are produced per acre.

Fifty-eight percent (1,775 acres) is rangeland and pastureland. Rangeland produces about .5 Animal Unit Months (AUMs) per acre. An AUM is the amount of forage needed to support a cow/calf for one month. Beef cattle are the predominant kind of livestock (North Dakota Crop and Livestock Reporting Service, 1980). There are also some dairy cattle, hogs, and sheep.

TABLE 3
AGRICULTURAL LAND USE
ON CENTER TRACT

Land Use:	Tract Acres	Average Production Per Acre 1/	Total Annual Production
Cropland	773	25.4 bu.	19,634 bu.
Hayland	327	1.75 tons	572 tons
Range	1,775	.5 AUMs	888 AUMs
Other	0	1.75 tons	0 tons
Fallow	168	n/a	n/a
Total	3,043	n/a	n/a

1/ Crop : wheat equivalent bu./acre
Hayland: tons/acre
Range : AUMs/acre
Other : tons/acre of hay equivalent

There are approximately 20 acres of shelterbelts, field windbreaks, and farmsteads per operation. There are some woody draws in the tract which are populated by native trees and shrubs.

Except for reseeded rangeland, the rangeland is in the widespread Mixed Grass Prairie type (Shaver, J.C. 1977). This includes species such as needle and thread, little bluestem, prairie sandreed, western wheatgrass, blue grama, side-oats grama, plainsmuhly, sedges, snowberry, fringed sagewort, and silver sage.

No federal threatened or endangered plant species have been identified in the tract. Largeleaf pondweed is found two miles east of the tract and is on the North Dakota State list.

There are 6 operators and operator partnerships with some land over unleased federal coal in the tract (Table 4). Operations range in size from 160 acres to 920 acres inside the tract and from 1,120 acres to 4,160 acres in total. Four of the operations have less than 25 percent of their lands within the tract. The operation most dependent on tract acres has 74 percent of its operation within the tract. Overall, the tract covers 25 percent of the acreage of the operations involved.

Agriculture in the area includes crop operations, livestock operations, and mixtures of both. Most operations in the area include a balance between crops and livestock, although there are a few that are predominantly of just one type.

Seventy-six percent of the acreage within the tract is farmed by lessees, or operators who do not own the land. Twenty-four percent is farmed by owner/operators.

TABLE 4

FARM/RANCH OPERATIONS - CENTER TRACT

INSIDE COAL TRACT (ACRES)							OUTSIDE COAL TRACTS (ACRES)								
OPERATOR	SMALL GRAIN CROP	HAY	GRAZING	SUMMER FALLOW	OTHER	TOTAL	PERCENTAGE OF	SMALL GRAIN	HAY	GRAZING	SUMMER FALLOW	OTHER	TOTAL	GRAND TOTAL	PERCENTAGE OF
							TOTAL ACRES LEASED								TOTAL ACRES IN TRACT
1	21	94	275	10	0	400	0	332	37	202	149	0	720	1120	36
2	313	33	477	97	0	920	83	754	535	1717	234	0	3240	4160	22
3	85	0	75	0	0	160	100	144	324	1132	0	0	1600	1760	9
4	98	0	22	40	0	160	0	408	194	904	94	0	1600	1760	9
5	113	35	314	21	0	483	100	234	149	1006	51	0	1440	1923	25
6	143	165	612	0	0	920	100	254	0	65	1	0	320	1240	74
TOTAL	773	327	1775	168	0	3043	76	2126	1239	5024	531	0	8920	11,963	25

AGRICULTURAL ECONOMICS

This section will be forthcoming under separate cover.

LAND USE

Land use within the boundary of the Center tract consists of agricultural use, primarily livestock grazing, and strip mining. The area includes scoria mining pits, a cemetery and part of the town of Center. The boundary of the tract surrounds the town of Center and includes portions of State Highway 25, State Highway 48, and a powerline right-of-way. Mining on the tract feeds the Milton Young Power Plant to the east of the tract.

RECREATION

Hunting of a variety of native species (deer, upland game birds, waterfowl) is the only recreational opportunity offered to the public on the tract. This opportunity, while significant to local people, has limited attraction to people outside the immediate vicinity of the proposed mining.

The community of Center, North Dakota offers recreational opportunities in the general vicinity of the tract. Ball diamonds, parks, a swimming pool and gymnasium facilities offer adequate opportunities at this time. Lake Sakakawea, north of the tract, offers state and federal recreational opportunities.

AESTHETICS

The character of the landscape as noted in other sections of this document is largely agricultural, principally grazed prairie. The dominant visual features in the area are spoil piles from existing mining. Coal mining activity within the tract boundary contrasts with the natural landscape in form and color. The lumpy nature of piles of spoil, typical of contemporary strip mining, are highly visible locally both from major transportation corridors and the town of Center because of the lack of intervening topographic features.

Lands in agricultural use are divided by north/south, east/west roads and fencelines. The appearance of these fields varies with the type of crop through the year and from year to year. At any given time actively cropped fields, fields in fallow and grazed prairie may stand side by side. The gently rolling topography upon which agricultural use is superimposed, gives legal dividing lines a curvilinear aspect when seen from normal viewing angles.

Manmade features are part of the character of this area, and thus are not unexpected, to either the local resident or the traveler who has encountered this element long before this area is viewed. The visual quality of the town of Center is poor at the present time, due to coal mining activities.

WILDLIFE

Native prairie dominates this broken and rolling topography. Native woodlands and wetlands are interspersed within the prairie. Some wetlands have survived the intensive farming. Mining has been completed on 20.1 percent of the photo interpreted area; wetlands compose 3.1 percent; native woodlands, 2.0 percent; native prairie, 34.4 percent; and agriculturally disturbed, 40.3 percent.

The coal tract is bounded on the south by Hagel Creek and Square Butte Creek on the north and east. The aquatic environment of these streams, the closed basin wetlands, the native woodlands, and interspersed native prairie in composite provide essential habitat for 31 sensitive species throughout the biological year. Whooping cranes, an endangered species, migrate through the area and use the regional wetlands (Table 5). The agriculturally disturbed land does not provide essential wildlife habitat, although it is used by numerous wildlife throughout the year.

Wetlands, specifically prairie potholes, are the most productive wildlife habitat in North Dakota.

All remaining native grasslands represent precious relics of the original prairie ecosystem. They evolved during thousands of years and, once destroyed, cannot be exactly duplicated by man. The rate of native prairie loss in North Dakota has been tremendous, and unplowed prairie is only 20 percent of the original total.

CULTURAL RESOURCES

Historic and prehistoric cultural resources have been recorded from the tract. This recording has been done in the course of systematic survey. Therefore, specific comments can be made about the effect of cultural resources on coal mining on the tract.

Sixty-nine percent of the surface of the tract has been the subject of intensive cultural resource inventory, while 59 percent of the surface over federal coal has been inventoried. This inventory has produced habitation sites as well as open plains task-specific and exploitative sites (i.e., bison kill sites; lithic scatters of varying size, density and function; seasonal and long-term habitation sites).

TABLE 5
WILDLIFE HABITAT AND SPECIES

Woodlands	Wetlands	Native Prairie	Agriculturally Disturbed
*Sharptail Grouse	*Hungarian Partridge	*Sharptail	Sharptail
*Hungarian Partridge	Mourning Dove	Hungarian Partridge	Hungarian Partridge
*Mourning Dove	*Pheasant	Mourning Dove	Mourning Dove
*Pheasant	*Mallard	*Whooping Crane	Pheasant
*Merlin	*Gadwall	*Merlin	Whooping Crane
*Swainson's Hawk	*Whooping Crane	Swainson's Hawk	Swainson's Hawk
Marsh Hawk	*Pintail	Marsh Hawk	Marsh Hawk
Ferruginous Hawk	*Greenwing teal	*Burrowing Owl	Ferruginous Hawk
*Loggerhead Shrike	*Widgeon	*Ferruginous Hawk	Whitetailed Deer
*Whitetailed Deer	*Shoveler	Loggerhead Shrike	Red Fox
*Mule Deer	*Redhead	Whitetailed Deer	Badger
Mink	*Canvasback	*Mule Deer	No. Swift Fox
Beaver	*Ruddy	*Antelope	
Red Fox	*Sandhill Crane	Mink	
Badger	*Swainson's Hawk	Red Fox	
No. Swift Fox	*Marsh Hawk	*Badger	
*Bobcat	*Sprague's Pipit	*No. Swift Fox	
	*Whitetailed Deer	Bobcat	
	*Muskrat		
	*Mink		
	*Beaver		
	*Red Fox		
	Badger		

*Essential habitat for species

ECONOMIC AND SOCIAL CONDITIONS

The rolling plains west of the Missouri River are an ideal location for the short-term occupations that are seen in the cultural resources from the tract. Short trips to exploit a variety of resources are seen in the pattern of prehistoric resources that have been recorded. It is likely that this pattern will continue in the future. It is not likely that resources recorded in the future will prevent coal mining, nor will any sites already recorded prevent mining.

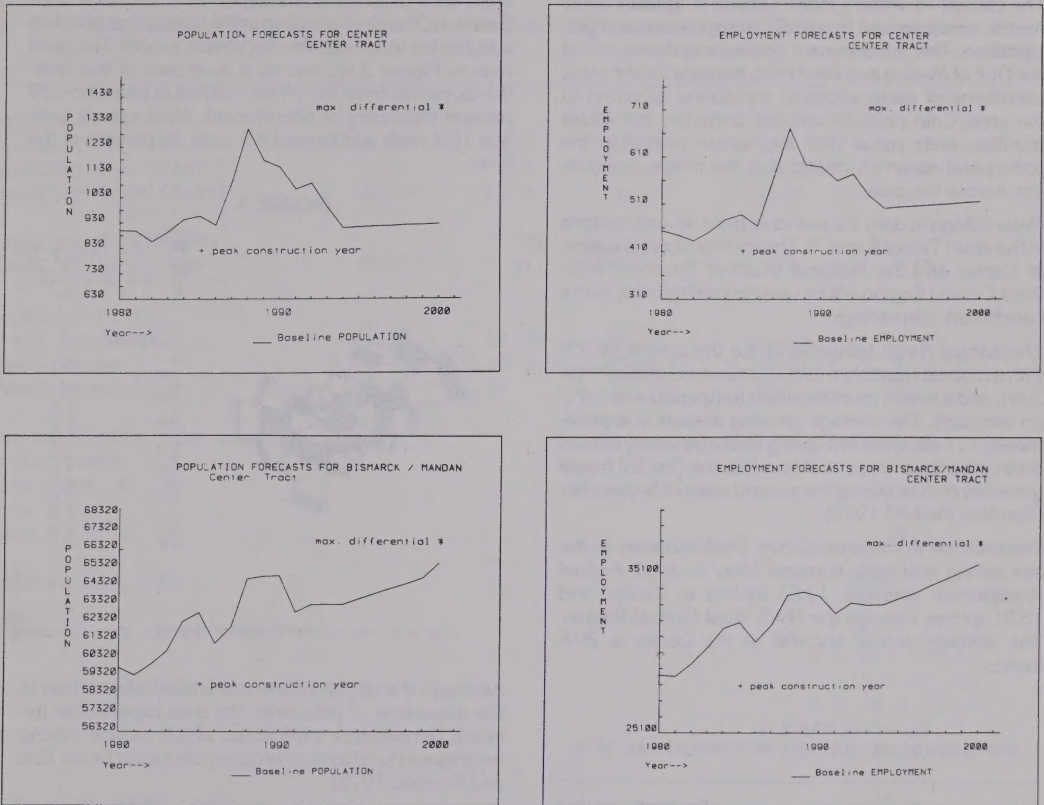
In the historic period, the dominant activity in the area has been homesteading and ranching. While some stock raising has taken place, most cultural manifestations are related to farming. This activity may also be responsible for the destruction of some cultural resources.

Existing and forecasted population and employment levels for the communities of Center and Bismarck/Mandan, North Dakota are shown in Figure 1 (Mountain West 1981). As can be seen from this figure, future population levels without federal coal leasing show considerable fluctuation through the early 1990's due to the construction of energy projects not directly related to the leasing of federal coal.

The vast majority of the Center mine (with which the Center tract is associated) employees currently reside in Center, Bismarck, and Mandan (Waldrun, 1981). The present (1981) condition of public services in the three communities is shown in Figure 2.

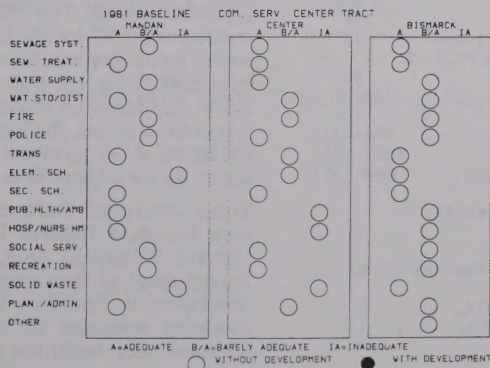
The adequacy ratings in Figure 2 reflect assessments by city planners and town councils. It should be recognized that some assessments were based on best judgment and are somewhat subjective.

FIGURE 1



SOURCE: Mountain West Research, Inc., 1981.

FIGURE 2



SOURCE: Respective city/county or regional planners.

CLIMATE AND AIR QUALITY

The climate of western North Dakota is typically continental, characterized by variable temperature and precipitation. The predominant pressure systems, out of the Gulf of Mexico and the Arctic, account for the rapid alterations of meteorological conditions common to the area. Cold polar air masses dominate the winter months, while moist Gulf air masses prevail in the spring and summer, distributing the major precipitation across the area.

Meteorological data are available from several stations in the area (Tables 6 and 7). The meteorological station at Center and the National Weather Service (NWS) West Central Region will be used to establish the tract's benchmark climatology.

The annual mean temperature for the area is 40.5°F with a highest monthly mean temperature of 69.0°F (in July), and a lowest monthly mean temperature of 8.5°F (in January). The average growing season is approximately 117 days; the last spring freeze generally occurs during the third week of May, while the first fall freeze generally occurs during the second week of September (Ramirez, Method 1976).

Precipitation in the area occurs predominately in the late spring and early summer (May to July). Annual precipitation averages 17.83 inches at Center, and 16.91 inches through the NWS West Central Region. The average annual snowfall at the Center is 29.8 inches.

TABLE 7
REPRESENTATIVE REGIONAL METEOROLOGICAL DATA

	Regional Values
Humidity (Annual Average), %	40-50
Lake Evaporation (Annual Avg.), in.	50-55
Extreme Weather	
Thunderstorms, days/year	30
Tornadoes, sightings/year	rare
Hail, days/year	2-4
Maximum recorded wind speed, mph*	72
Inversion Frequency (base 1500 ft.), %	
Annual	35
Seasonal Range	30-50
Mixing Height, ft.	
Mean Annual Morning	984-1312
Mean Annual Afternoon	4921-5249
Mean Seasonal Afternoon Range	1968-7874

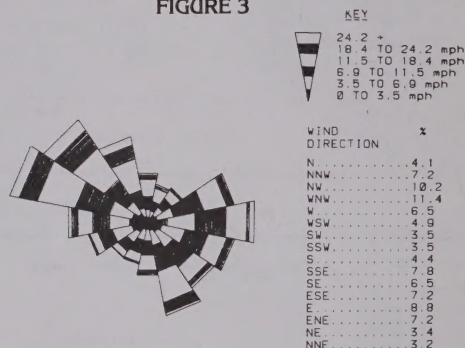
*Recorded at Bismarck, North Dakota

Sources:

Brum, L. J., J. W. Enz and J. M. Ramirez 1978.
Jensen, R. E. 1974.
Ramirez, J. M. and T. Method 1976.
U.S. Department of Commerce 1974.

Wind data used for this analysis were obtained from Bismarck, the closest station in the vicinity that had data suitable for input into the dispersion model. The wind rose in Figure 3 represents a summary of this data. Winds prevail from the WNW to NNW at Bismarck (29 percent frequency of occurrence). Wind speeds average 10.2 mph and exceed 11.5 mph 36 percent of the time.

FIGURE 3



WIND ROSE FOR BISMARCK NORTH DAKOTA

Although the terrain offers only limited obstruction to the dispersion of pollutants, the area experiences frequent temperature inversions, which reduce mixing heights and tend to concentrate pollutants (Brum, Enz and Ramirez 1978).

Table 8 presents pertinent air monitoring data from ambient air monitoring stations in the general vicinity. Recorded annual geometric mean concentrations for total suspended particulates (TSP) from area rural locations have ranged from 19 ug/m³ (at Stanton) to 32 ug/m³ (at Beulah). The TSP annual geometric mean concentration at locally privately operated impact source monitoring sites have ranged from 19 ug/m³ (at Minnesota Power and Light, Center), to 85 ug/m³ (at RAMP #3, Beulah). For the purpose of the following computer analyses, the background rural TSP levels will be set at 24 ug/m³ for the annual level and 100 ug/m³ for the 24-hour level.

Three Class I areas, the North and South Units of Theodore Roosevelt National Park and the Lostwoods National Wilderness Area, fall within the potential impact range of the proposed tract and associated developments. Based on 1979 air quality computer modeling estimates by the North Dakota State Department of Health, the allotted 24-hour SO₂ increment for the South Unit of the Park is consumed, or nearly consumed.

TABLE 6*
METEOROLOGICAL DATA FOR SELECTED SITES

Parameter	Center	Beulah	Washburn	New Salem	Bismarck (WSO)	NWS West Central Region
Temperature, °F						
$\bar{X}$ annual, °F	40.5	40.6	41.9	41.4	41.5	40.6
$\bar{X}$ monthly low (Jan)	8.5	7.6	9.3	9.8	8.2	8.4
$\bar{X}$ monthly high (July)	69.0	69.3	70.8	69.9	70.8	69.4
Average growing season (temp. 32° F), days	117	121	133	128	133	120
Precipitation, in.						
Annual average	17.45	17.20	18.01	16.65	15.15	16.91
Annual range	0.48-3.55	0.32-3.97	0.35-4.11	0.34-3.77	0.36-3.40	0.40-3.92
Annual snowfall	29.8	27	30	34	40	30
Annual stability, (by class)						
% occurrence						
Class A, B, C					14.3	
Class D					56.4	
Class E, F, G					29.3	
Wind direction, (%)					W-NW(28)	
Wind speed, mph (% of time)					0-3.5 (15.8) 3.6-6.9 (20.6) 7-11.5 (27.1) 11.6-18.4 (23.8) 18.5-24 (9.3) >24 (3.3)	
Average wind speed, mph					10.8	

*SOURCES:

Jensen, R. E. 1972.
North Dakota Crop & Livestock Reporting Service 1980.
Ramirez, J. M. and T. Method 1976.
Ramirez, J. M. 1972.
Ramirez, J. M. 1973.
U.S. Department of Commerce 1948-1964; 1973; 1974; 1977; 1979a; 1979b.

TABLE 8*
WEST CENTRAL NORTH DAKOTA AIR MONITORING DATA*

Monitoring Site	Year	Parameter	No. Observations	Max. Observation (ug/m ³)	2nd Max. Observation (ug/m ³)	Annual Geom. Mean (ug/m ³)	Annual Arith. Mean (ug/m ³)
<u>State-Operated Sites:</u>							
Stanton (rural)	76	TSP	61	150	104	31	39
	77	TSP	60	237	90	24	32
	78	TSP	58	104	67	19	24
	79	TSP	42	90	80	19	25
Washburn (rural)	76	TSP	55	127	82	27	35
	77	TSP	55	154	100	25	33
	78	TSP	36	128	108	23	34
Beulah (rural)	74	TSP	10	488	47	26	69
	75	TSP	39	171	141	24	37
	76	TSP	51	81	61	24	29
	77	TSP	58	224	73	24	31
	78	TSP	52	288	258	32	52
	79	TSP	28	82	78	22	28
<u>Privately-Operated Impact Source Monitoring Sites:</u>							
MN Power & Light Bittner	80**	TSP		47		19	
		SO ₂		191			<5
MN Power & Light Orgaard	80**	TSP		63		22	
		SO ₂		141			<5
Ramp #1 Beulah	79	TSP	11	161	93	57	69
		SO ₂	1403	78	65	<5	<5
	80	TSP	59	642	125	44	41
		SO ₂	6250	81	63	<5	<5
Ramp #2 Beulah	79	TSP	11	76	74	42	47
		SO ₂	1401	52	52	<5	<5
	80	TSP	57	613	156	25	45
		SO ₂	6251	91	84	<5	<5
Ramp #3 Beulah	79	TSP	11	1000	114	85	158
		SO ₂	1401	52	52	<5	<5
	80	TSP	58	141	96	26	34
		SO ₂	6239	148	107	<5	<5
Ramp #4	79	TSP	11	121	120	85	158
		SO ₂	1403	102	63	<5	<5
	80	TSP	41	523	161	26	34
		SO ₂	4141	165	151	<5	<5
Ramp #5 Beulah	79	TSP	11	129	89	45	56
		SO ₂	1404	37	31	<5	<5
	80	TSP	59	707	126	21	41
		SO ₂	6164	60	57	<5	<5

* SOURCE - North Dakota State Department of Health

**Samples from third and fourth quarter (July-December)

CHAPTER III

ENVIRONMENTAL CONSEQUENCES

TOPOGRAPHY

The natural contour of the land over unleased federal coal would be modified during surface mining. In total, 9,168 acres would be disturbed during the assumed 48-year mine life. Although most would be returned to its approximate original contour, difference in detail would remain, including drainage patterns and final sloped highwalls.

In general, the reshaped land would not be steep enough to cause slope failures and related hazards. Until natural vegetation can be reestablished, accelerated erosion resulting in unsightly scars on the land would be potential problems.

GEOLOGY AND MINERALS

The major impact of the leasing alternative would be the addition of 19.1 million tons of recoverable federal coal to the reserves available for mining. These reserves might very well be bypassed if not leased. Mineral resource conflicts might occur since there is some potential for finding oil and gas on the tract.

SOILS AND RECLAMATION POTENTIAL

The types of impacts affecting the soil resource in this area have previously been discussed in Bureau of Land Management planning documents (Unit Resource Analysis, MFP) and the Draft West Central North Dakota Regional Environmental Impact Study. The basic impacts from mining on these tracts would be the disruption of the present soil bodies with temporary loss of productivity, in addition to problems associated with erosion, compaction, and instability.

Soil erosion and compaction would not be new to the area because of dryland agricultural activity and coal mining that already exist in the tract. These problems increase during soil handling activities but decrease during other stages of mining. They should not cause significant detrimental effects to the soil resource if the required stipulations are followed.

Some instability problems are usually associated with the onset of reclamation. Area-wide settling, localized subsidence or collapse, and underground erosion called piping may occur (Groenwald, 1980). However, if the required stipulations covering the handling of soils and overburden during surface mining operations are closely adhered to and enforced, these impacts

should be minimal. The gentle to moderate slopes over most of the land involved in this analysis would aid in the workability of material and make corrective measures on problem spots easier to carry out.

The soils would be lost to the production of grass, forage, and grain over the short-term use (about 10 years for each annual disturbance and 183 acres) of the tract for coal mining. This loss is occurring only on the active portion of the mine at any given time. Once in full operation, the total tract area out of production in any peak mining year is estimated at 1,800 acres. Soils will be continuously replaced on mined-out areas and brought back into production during the life of the mine (50 years).

Preliminary indications, from completed and ongoing research by such agencies as the Science and Education Administration—Agricultural Research (SEA-AR) of Mandan, North Dakota, and North Dakota State University—Agricultural Experiment Station (NDSU-AES) of Fargo, are that productivity of mined land can be restored. Much depends, however, on the planning and implementation of a concerted reclamation effort (Power, 1974).

Successful return of agricultural productivity of the land over federal coal should be possible. Soils Table 2, in Chapter II, indicates that landowners have sufficient acreage of soil rated "good" and "fair" for supplying cover soil material in surface mine reclamation. Data from coredrill holes tested for Baukol-Noonan's Center Mine located within this tract indicate that some of the top 25 to 50 feet of the overburden is even suitable in reconstructing soil profiles. By averaging suitable plant growth material from the better soils and/or overburden and leaving steeper slopes more gently sloping with reclamation, it might be possible to improve the overall productivity of the land, especially that portion rated "poor."

HYDROLOGY

The unleased federal coal in this tract lies around its perimeter. Mining the federal coal in addition to the private coal would have the effect of expanding the area of impacts by the size of the federal coal tracts.

Both the Kinneman Creek and Hagel Creek lignite beds are sources of groundwater in this area. As they are mined these aquifers would be removed. While the mine pits are open, water levels in the lignite aquifers would be drawn down in the area surrounding an open pit. The distance this drawdown would occur from an

open pit is variable and dependent upon the local aquifer characteristics.

The physical disturbance caused by mining can also result in changes in the chemical quality of the local groundwater. Increases in sodium, sulfates and total dissolved solids concentrations have been reported by Groenewold (1979 and 1980) at other mines in North Dakota with similar overburden. The changes in water quality were variable but dependent upon overburden characteristics and reclamation practices. The quality of water in the replaced overburden would be similarly degraded.

This impact would be limited to the area within the tract. There are about five or six water wells in the vicinity of the federal coal that may experience the impacts discussed above. Replacement water supplies are available in a sand zone below the Hagel Creek lignite.

VEGETATION AND AGRICULTURAL PRODUCTION

The proposed action would progressively remove an average of 183 acres of the total tract area per year from its current uses. The major use of these lands is agricultural production. The first land taken out of agricultural operations, except for the plant site and ancillary facilities, will occur in the first year of mining. The time period of removal from agricultural production would be the time spent in mining and land reclamation. The entire tract would be progressively mined over a 50 year period.

Mining of any one location would be the land use for one to five years depending on the type of mining. Land reconstruction to premine levels of agricultural production would require a total of approximately ten years. The land would be placed into the premining type of agricultural production or other premining uses that the landowner and Public Service Commission agree upon (wildlife habitat, woodlands, or rights-of-way). Vegetation reestablishment would occur during the first appropriate season after grading to topography and replacing topsoil.

The company would be under bond for at least ten years, to as long as necessary to prove, at a 90 percent confidence level, that agricultural productive capacity had been restored to equal or better than it was before mining (Public Service Commission, Reclamation Department, 1980). Reclamation research by such agencies as the Science Education Administration—Agricultural Research Service (SEA-AR) and North Dakota State University—Agricultural Experiment Station (NDSU-AES) indicates that some degree of optimism for the restoration of land to agricultural production is justified. There is no certainty as to how long it would be before all mined land would be judged to be as fully restored as the law requires.

The leasing and development alternative would have a significant short-term impact on individual agricultural operations in the tract. By the end of the 50-year mine life, 11,136 acres of the tract including 3,043 acres of operations which include lands over unleased federal coal would be disturbed, in addition to 160 surface acres used for mine facilities.

For the operations which include lands over unleased federal coal, an average of 46 acres of cropland, excluding summer fallow, would be removed from production for these operations each year, assuming an annual disturbance of 183 acres over a 17-year period for operations which include lands over federal coal. This would be an average annual loss of 1,168 bushels of wheat. This 46 acres of cropland would be out of production in any one peak mining year, resulting in a maximum loss of 11,582 bushels of wheat annually. peak mining year, resulting in a maximum loss of 11,582 bushels of wheat annually.

Peak mining year disturbance of 193 acres of hayland would result in an annual loss of 338 tons of hay production.

An average of 106 acres of rangeland for the operations which include lands over unleased federal coal would also be removed from production each year, resulting in an average loss of 53 AUMs. This 106 acres of rangeland would be out of production ten years with a maximum of 1,047 acres out of production in any one peak mining year, resulting in a maximum annual loss of 524 AUMs.

Regionally, these losses would not pose significant reductions in area agricultural production.

Time constraints necessitated the Bureau of Land Management doing agricultural data collection on the preliminary logical mining unit instead of the later final logical mining unit. The data may not completely represent the logical mining unit in its final form.

In reestablished native-type range it is likely that some introduced species will be used. The laws require that introduced species be of the same seasonal variety and of equal or superior utility to the native species. Some of the more sensitive plants (for cropland, woodland, or rangeland use) may have difficulty in becoming established on some of the less suitable soils.

Forbs, woody plants, and trees (woodlands) must be reestablished along with grasses.

AGRICULTURAL ECONOMICS

This section will be forthcoming under separate cover.

LAND USE

Existing agricultural land use would be physically displaced by mining operations and reclamation for a period of ten years. Roads in the tract would be either bypassed or relocated, causing some inconvenience.

The town of Center is restricted by the boundary from expanding, but expansion is not very likely, as the action is a perpetuation of the existing situation.

RECREATION

Habitat destruction and the resulting loss of wildlife species (deer, upland game birds, waterfowl) will damage recreational hunting. From the recreation perspective, it is likely the loss will be manageable.

From the recreation perspective, it is likely the loss will be manageable.

Social and economic studies have documented demographic changes resulting from mining that will stress Center, North Dakota, and other communities in the vicinity of the tract. This stress will be felt on the available recreation facilities in the communities. Outside of the communities, increased pressure will be seen on private and public land because of recreational opportunities lost to mine-related impacts.

AESTHETICS

The effect of leasing is the perpetuation of an existing use and is likely to be accepted as a part of the character of the region. Expansion of the mine would alter areas that would be visible from Center, State Highway 25 and State Highway 48. If reclaimed according to state law and federal regulation, however, the mining activity would not be as visible as existing activity. The principal impact would be reduction of visual amenity in views from the town of Center.

WILDLIFE

On-site effects to wildlife resources would be degradation and loss of the three essential habitats: woodlands, wetlands, and interspersed native prairie. If these habitats are destroyed by mining within the proposed tract, it would constitute a significant negative impact and an irretrievable commitment of wildlife resources.

Off-site aquatic habitats in the Missouri River and Square Butte Creek would be potential recipients of point and non-point contaminants.

There would be a significant area loss to wildlife resources if strip mining occurs in the essential wetlands, woodlands, and native prairie and they are not reclaimed in full or are converted to farmland.

Mobile wildlife such as birds and large mammals may shift about the habitat losses to some degree, but non-mobile species such as reptiles and amphibians would be destroyed. The very limited availability and disruption of riparian woodlands and wetlands would restrict, and in many cases exclude, the accommodation of disturbed mobile wildlife.

Noise, presence of humans, heavy equipment, dust, and affiliated disturbances cumulatively may cause wildlife to vacate unmined habitats, and may preclude adoption by wildlife of those rehabilitated areas until the disturbances are eliminated. This may be for the life of the mine and rehabilitation period, which may be as long as 20 or more years.

Increased human populations resultant of mine development and operations generally reduce wildlife populations and habitat locally and off-site by poaching, road kills, increased legal harvest, disturbance of reproductive and migratory periods and habitats, harassment by recreationists, feral and uncontrolled cats and dogs, and degradation and complete loss of habitat due to housing, shopping centers, waste treatment plants, and similar urban development. The problem is compounded in areas where shift changes of workers coincide with wildlife feeding periods, especially big game. The same would probably occur in this area.

Action to mitigate these impacts, available to entities other than BLM, would be to provide mass transportation of workers and adjust the times of shift changes which would greatly reduce poaching. This has been used successfully in other mining areas. Providing funds for the North Dakota Game and Fish Department for increased law enforcement or adoption of a poaching clause in union contracts would also help.

Successful reclamation of native woodlands and wetlands such as "potholes" and riverine wetlands has not been demonstrated. Native prairie has not been successfully reclaimed either, although some prairie plowed about 70 years ago and since left undisturbed has experienced some native plant species reestablishment.

Concurrent replacement (compensation) of lost wildlife habitat within 12 to 18 months after mining may reduce a few of the less negative wildlife impacts. However, disruption or loss of any of the larger wetlands and riparian woodlands is expected to become a permanent loss.

At present there is no data to suggest that natural, biologically viable wetlands (e.g., potholes) can be recreated from mine spoil in this country. It would be most productive and conservative to eliminate mining from the larger wetlands thereby retaining the critical soils structure of the wetlands and eliminating the extended delay proposed for wetlands reclamation attempts. Destruction of natural viable wetlands by strip

mining under the present state of biological and hydrological knowledge would be an irretrievable commitment of wildlife resources.

An interagency team of wildlife biologists from the North Dakota Game and Fish Department, U.S. Fish and Wildlife Service, and Bureau of Land Management has identified and recommended areas for the application of unsuitability criteria (Map 3 Chapter 3). Formal recommendations have been received by BLM from both agencies. Joint agreement among the agencies and final decisions on unsuitability, exemptions such as producing leases, and exceptions will be completed in August 1981.

CULTURAL RESOURCES

All cultural resources within the tract boundaries are subject to direct and indirect impacts. Direct impacts are those that result from ground disturbance activities and can result in damage and destruction to sites, artifacts, their environmental context and the data they contain.

Sites not directly impacted by earth disturbance may be impacted as a result of the earth disturbance. These secondary impacts can include vandalism increased by improved access, loss as a result of erosion, or degradation resulting from disruption of natural setting.

In the event of lease, stipulations covering cultural resources will have to be developed. These stipulations will have to treat both recorded and unrecorded sites. They will also have to require management plans for cultural resources that detail mitigation plans for each site to be impacted. As in any cultural resources mitigation, preservation alternatives are preferred. If these options are not viable, then scientific data recovery programs will have to be developed.

ECONOMIC AND SOCIAL CONDITIONS

It is unlikely that the employment level of the mine would significantly change if the Center tract is leased. Without a change in mine employment, the population level of the surrounding communities would remain stable. This would result in no additional impacts to community services or changes in social conditions.

The only effect of leasing on community services would be a continuation of the existing level of demand for these services for an additional 40 years (life of the mine). The present condition of public services, in communities where existing mine employees reside, was shown in Figure 2.

Technical reports are available which discuss the methodology used in the economic and social analysis.

NET ENERGY ANALYSIS

A net energy analysis was calculated using the guidance contained in BLM Washington Office Information Memo 80-640, July 17, 1980. Approximately 37.7 British thermal units (Btus) would be expended to produce a pound of coal. That pound of coal, in turn, would produce about 6747 Btus. The ratio of energy produced to that expended is 179.0 Btus/1 Btu.

CLIMATE AND AIR QUALITY

Impacts on climate from the proposed action cannot be addressed specifically. This is due to a lack of technical information and research work on the topic of potential impacts on climate. However, general climatic influences applicable to the proposed development can be discussed.

The modification of surface contours and albedo due to redistribution of soils and removal of vegetation may produce slight localized changes in wind speed and direction, temperature, and humidity. Impacts associated with the increased particulate emissions could also alter local climatic conditions. Reclamation with reestablishment of vegetation and a stable landscape should largely mitigate these impacts over the long-term.

The methodology for determining the air quality impact of particulate emissions consists of: 1) obtaining mine profiles for the tract from the Bureau of Land Management (BLM); 2) obtaining emission factors for individual surface coal mining operations; 3) using the mine profile and emission factors for calculation of total emissions; 4) entering the emission data into a modified climatological dispersion model (CDMQC) for prediction of ambient concentrations; and 5) comparing predicted concentrations to Federal and State Ambient Air Quality Standards and to Prevention of Significant Deterioration (PSD) increments. The air quality impact was analyzed for the proposed tract's peak production period.

Details about the CDMQC model, emission factors, and their application appear in the technical report (separate cover).

The results of the modeling analysis were plotted on an isopleth map. The predicted concentrations were then compared with applicable air quality standards. The 1970 Clean Air Act Amendments establish primary and secondary National Ambient Air Quality Standards (NAAQS). North Dakota established air quality standards in 1969. The present Federal and State ambient air quality standards are shown in Table 9.

All pollutant sources must be evaluated to determine if PSD regulations apply. Preliminary evaluations indicate that the proposed coal mine's product emissions (coal

TABLE 9
COMPARISON OF AMBIENT STANDARDS
FEDERAL VS. NORTH DAKOTA

Federal Ambient Air Quality Standards (UPA)				North Dakota Ambient Air Quality Standards	
Pollutant	Wording of Standard	Secondary Standard	Primary Standard	Primary Standard	Wording of Standard
TOTAL SUSPENDED PARTICULATES	Annual geo. mean conc.	60 $\mu\text{g}/\text{m}^3$	75 $\mu\text{g}/\text{m}^3$	60 $\mu\text{g}/\text{m}^3$	Annual geo. mean conc.
	Max. 24-hr. concentration not to be exceeded more than once per year	150 $\mu\text{g}/\text{m}^3$	260 $\mu\text{g}/\text{m}^3$	250 $\mu\text{g}/\text{m}^3$	Max. 24-hr. conc. not to be exceeded more than once per year
SETTLED PARTICULATES (Dustfall)	(At present there is no federal standard.)			15 tons/sq. mile 30 tons/sq. mile	Max. 3-month arithmetic mean in residential areas Max. 3-month arithmetic mean in heavy industrial areas
COEFFICIENT OF HAZE	(At present there is no federal standard)			0.4 coh. per 1000 linear ft.	Max. annual geo. mean
SULFUR DIOXIDE	Annual arith. avg. conc.		.03 ppm (80 $\mu\text{g}/\text{m}^3$)	60 $\mu\text{g}/\text{m}^3$ (0.02 ppm)	Max. annual arithmetic mean
	Max. 24-hr. concentration not to be exceeded more than once per year		.14 ppm (365 $\mu\text{g}/\text{m}^3$)	260 $\mu\text{g}/\text{m}^3$ (0.10 ppm)	Max. 24-hr. conc.
	Max. 3-hr. concentration not to be exceeded more than once per year	.50 ppm (1300 $\mu\text{g}/\text{m}^3$)		715 $\mu\text{g}/\text{m}^3$ (0.24 ppm)	Max. 1-hr. concentration
REACTIVE SULFUR (Sulfation)	(At present there is no federal standard)			0.24 mg $\text{SO}_2/100 \text{ cm}^3/\text{day}$ 0.50 mg $\text{SO}_2/100 \text{ cm}^3/\text{day}$	Max. annual arithmetic mean Max. for a 1-month period
SUSPENDED SULFATE	(At present there is no federal standard)			4 $\mu\text{g}/\text{m}^3$ 12 $\mu\text{g}/\text{m}^3$	Max. annual arithmetic mean Max. 24-hr. conc. not to be exceeded over 1 percent of the time
SULFURIC ACID MIST, SULFUR TRIOXIDE OR ANY COMBINATION THEREOF	(At present there is no federal standard)			4 $\mu\text{g}/\text{m}^3$ 12 $\mu\text{g}/\text{m}^3$ 30 $\mu\text{g}/\text{m}^3$	Max. annual arithmetic mean Max. 24-hr. conc. not to be exceeded over 1 percent of the time Max. 1-hr. concentration not to be exceeded over 1 percent of the time

TABLE 9 (cont.)
COMPARISON OF AMBIENT STANDARDS
FEDERAL VS. NORTH DAKOTA

Federal Ambient Air Quality Standards (UPA)				North Dakota Ambient Air Quality Standards	
Pollutant	Wording of Standard	Secondary Standard	Primary Standard	Primary Standard	Wording of Standard
HYDROGEN SULFIDE	(At present there is no federal standard)			45 ug/m ³ (0.032 ppm)	Max. ½-hr. conc. not to be exceeded more than twice in any 5 consecutive days.
				75 ug/m ³ (0.054 ppm)	Max. ½-hr. conc. not to be exceeded over twice a year
CARBON MONOXIDE	Max. 3-hr. concentration not to be exceeded more than once per year	9 ppm (10 ug/m ³)	9 ppm (10 ug/m ³)	10 ug/m ³ (9 ppm)	Max. 3-hr. conc. not to be exceeded more than once per year
	Max. 1-hr. concentration not to be exceeded more than once per year	35 ppm (40 ug/m ³)	35 ppm (40 ug/m ³)	40 ug/m ³ (35 ppm)	Max. 1-hr. conc. not to be exceeded more than once per year
OZONE	Max. 1-hr. concentration not to be exceeded more than once per year	0.12 ppm _v (235 ug/m ³)	0.12 ppm _v (235 ug/m ³)	235 ug/m ³ (0.12 ppm)	Max. 1-hr. conc. not to be exceeded more than once per year
HYDROCARBONS (Less Meth.)	Max. 3-hr. concentration (6-9 a.m.) not to be exceeded more than once per year	.24 ppm _v (160 ug/m ³)	.24 ppm _v (160 ug/m ³)	160 ug/m ³ (0.24 ppm)	Max. 3-hr. conc. (6-9 a.m.) not to be exceeded more than once per year
NITROGEN DIOXIDE	Annual arithmetic avg. concentration	.05 ppm _v (100 ug/m ³)	.05 ppm _v (100 ug/m ³)	100 ug/m ³ (0.05 ppm)	Max. annual arithmetic mean
				200 ug/m ³ (0.10 ppm)	Max. 1-hr. conc. not to be exceeded over 1 percent of the time in any 3-month period
LEAD	Quarterly arithmetic mean		1.5 ug/m ³	1.5 ug/m ³	Quarterly arithmetic mean

Sources:

National Ambient Air Quality Standards. 1978.
North Dakota Air Pollution Regulations. 1978.

dust) would be less than 250 tons/year; therefore, the coal mine is not a PSD source. However, the State PSD regulations specify that if the fugitive dust emissions cause the total potential particulate emissions to be in excess of 250 tons/year, then the source consumes PSD increment (i.e., these sources do not have to meet PSD regulations, but, the emissions from these sources are counted against PSD increment). Table 10 shows Federal and State PSD standards.

During peak production of the mine an estimated 1,505 tons per year would be emitted, with the best available control technology applied. Fugitive dust sources would account for 96 percent of the peak production emissions.

Dispersion modeling was performed to predict particulate concentrations for comparison with State and National Ambient Air Quality Standards. Areas within the active mining area, such as the mine facilities, pit area, and reclamation areas, are not subject to these standards.

The isopleth lines on Figure 4 indicate annual average particulate concentrations that could result during peak production; the highest concentration at a location off the mine site could be 6.2 ug/m^3 . This level would consume the allowable Class II PSD annual increment for particulates. With the annual background concentration added (22 ug/m^3), the ambient level should not exceed State or Federal Ambient Air Quality Standards.

In addition to the annual particulate standard of 60 ug/m^3 , North Dakota has a 24-hour standard of 150 ug/m^3 that cannot be exceeded more than once per year off the mine site. Figure 5 shows the predicted highest particulate concentrations for 24-hour averaging times, resulting from the proposed action. The predicted highest 24-hour values associated with the proposed action during peak production could be as high as 38 ug/m^3 . This level would consume the allowable Class II PSD 24-hour increment for particulates. With the estimated 24-hour background concentration added (100 ug/m^3), the ambient level would be 138 ug/m^3 . This level complies with the State and Federal Ambient Air Quality Standards. There is a possibility that the proposed action could violate State and Federal ambient TSP standards, but this is subject to the mine emissions and the corresponding background levels in the area.

Because the proposed action totally consumes the allowable Class II PSD increments for particulates, any associated PSD source could not contribute significantly ($5 \text{ ug/m}^3\text{-24-hour}$) to the PSD's Class II annual or 24-hour particulates increment.

Several small sources of gaseous pollutants are associated with surface coal mining operations.

During peak production, the relatively small gaseous emissions associated with the mining operations are not expected to violate air quality standards. Gaseous emissions for mining sources were not modeled because of their expected limited impacts to the air quality.

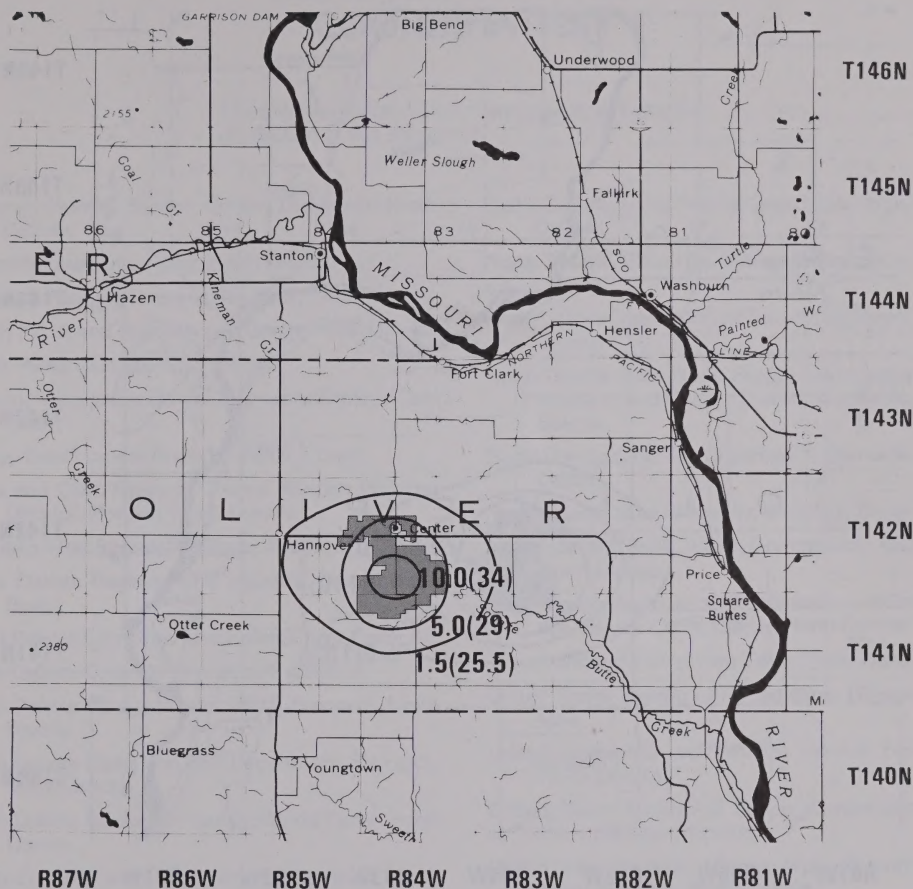
TABLE 10
FEDERAL AND STATE PSD STANDARDS

	Federal ¹	State ³
Major Sources, subject to PSD review (excludes fugitive dust emissions) (t/yr)	100 ¹ 250 ²	100 ³ 250 ⁴
Major Sources, not subject to PSD review—counts against PSD increment (considers fugitive dust emissions) (t/yr)	100 ¹ 250 ²	100 ³ 250 ⁴
Deterioration Increments for Area Designations		
Particulates		
Class I		
annual geometric mean ₃ (ug/m ³)	5	5
24-hour maximum (ug/m ³)	10	10
Class II		
annual geometric mean ₃ (ug/m ³)	19	10
24-hour maximum (ug/m ³)	37	30
Class III		
annual geometric mean ₃ (ug/m ³)	37	37
24-hour maximum (ug/m ³)	75	75
Sulfur Dioxide		
Class I		
annual arithmetic mean ₃ (ug/m ³)	2	2
24-hour maximum (ug/m ³)	5	5
3-hour maximum (ug/m ³)	25	25
Class II		
annual arithmetic mean ₃ (ug/m ³)	20	15
24-hour maximum (ug/m ³)	91	91
3-hour maximum (ug/m ³)	512	512
Class III		
annual arithmetic mean ₃ (ug/m ³)	40	40
24-hour maximum (ug/m ³)	182	182
3-hour maximum (ug/m ³)	700	700

1. Listed sources; CFR Chapter 51:24
2. All other sources (includes coal mines); CFR Chapter 51:24
3. Listed sources; N.D.A.C. Chapter 33-15-15
4. All other sources (includes coal mines); N.D.A.C. Chapter 33-15-15

*SOURCES

Prevention of Significant Deterioration of Air Quality. 1978. Chapter 33-15-15 NDAC Requirement for Preparation, Adaption and Submittal of Implementation Plan. 1978. Title 40 CFR, Part 51.



Scale 1:500,000

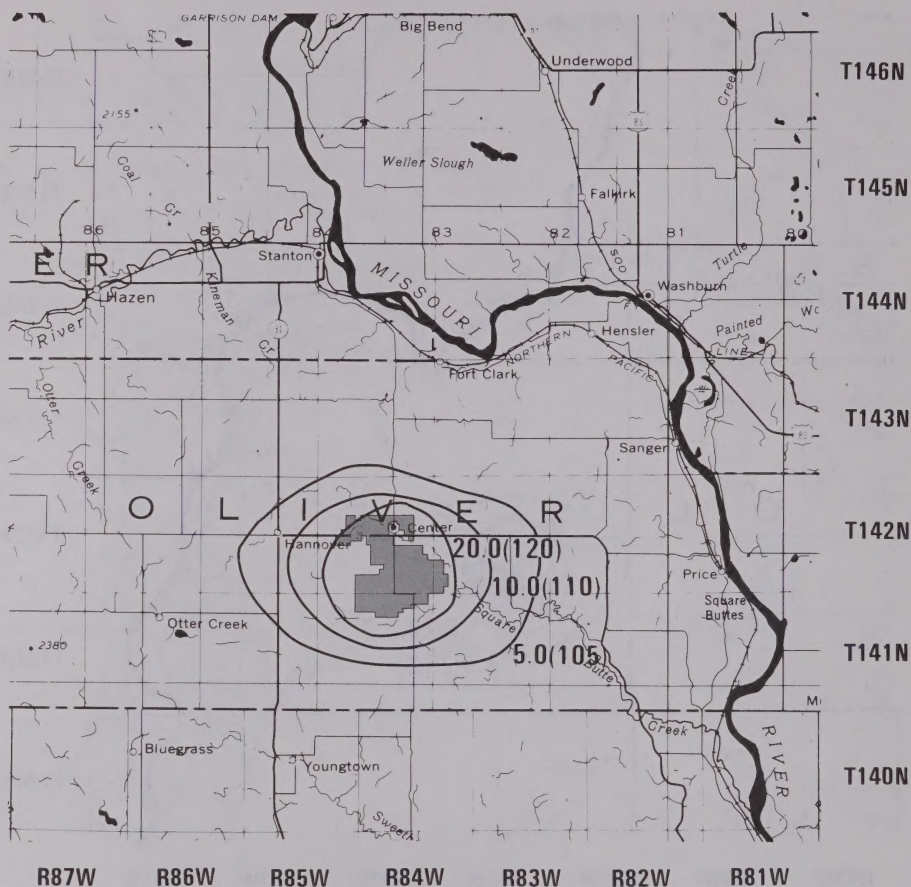
10 0 10 20 Miles

Center Tract

TSP Annual Average Concentration ($\mu\text{g}/\text{m}^3$) Isopleths

Note: Number in parenthesis indicates predicted concentration plus background concentration.

FIGURE 4



Center Tract

TSP Maximum 24-hour Concentration ($\mu\text{g}/\text{m}^3$) Isopleths

Note: Number in parenthesis indicates predicted concentration plus background concentration.

FIGURE 5

CHAPTER IV CONSULTATION AND COORDINATION

The following organizations were consulted during the production of this document.

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| Badlands Human Service Center; Dickinson, North Dakota. | North Dakota Social Service Board; Bismarck, North Dakota. |
| Baukol-Noonan, Inc.; Minot, North Dakota. | North Dakota State Fire Marshall; Bismarck, North Dakota. |
| Bismarck Planning Director; Bismarck, North Dakota. | North Dakota State Historical Society; Bismarck, North Dakota. |
| Center Mayor and Town Council; Center, North Dakota. | North Dakota State Public Service Commission, Reclamation and Siting Division; Bismarck, North Dakota. |
| Cumin Associates; Billings, Montana. | North Dakota State Tax Department; Bismarck, North Dakota. |
| Eastern Montana Social and Community Services Task Force. | North Dakota State University, Sociology Department. |
| Energy Development Board of Mercer County. | North Dakota State Water Commission; Bismarck, North Dakota. |
| Lewis and Clark Regional Council Mandan Planning Director; Mandan, North Dakota. | Oliver County Agricultural, Stabilization, and Conservation Service Office; Center, North Dakota. |
| Mountain West Research; Billings, Montana. | Three Affiliated Tribes; New Town, North Dakota. |
| North Dakota Business and Industrial Development Board. | United States Bureau of Reclamation; Billings, Montana. |
| North Dakota Combined Law Enforcement Council. | United States Fish and Wildlife Service; Bismarck, North Dakota. |
| North Dakota Community Action Association. | United States Geological Survey, Conservation Division; Billings, Montana. |
| North Dakota Energy Impact Office; Bismarck, North Dakota. | United States Geological Survey, Water Resources Division; Bismarck, North Dakota. |
| North Dakota Game and Fish Department; Bismarck, North Dakota. | University of North Dakota, Office of Rural Health. |
| North Dakota Geological Survey; Grand Forks, North Dakota. | |
| North Dakota Health Department; Bismarck, North Dakota. | |
| North Dakota Job Service; Bismarck, North Dakota. | |

ARTICLE CONSTITUTION AND BY-LAWS

OF THE
SOCIETY OF THE FRIENDS OF THE
HUMAN RIGHTS

THE SOCIETY OF THE FRIENDS OF THE HUMAN RIGHTS
IS A BODY OF VOLUNTARILY ASSOCIATED PERSONS
WHO HAVE FORMED THEMSELVES INTO A SOCIETY
FOR THE PURPOSE OF PROMOTING THE
INTERESTS OF HUMANITY AND THE
WELFARE OF MANKIND.
THE SOCIETY IS COMPOSED OF
MEMBERS WHO ARE OF ALL
NATIONS, LANGUAGES, AND
RELIGIONS, AND WHO ARE
UNITED BY A COMMON
DESIRE TO PROMOTE THE
HUMAN RIGHTS OF ALL
PEOPLE.
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AND RELIGIONS, AND WHO
ARE UNITED BY A COMMON
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HUMAN RIGHTS OF ALL
PEOPLE.

REFERENCES

- Ahler, S. A. et al. 1979. Archaeological Reconnaissance and Test Excavation in the Glenharold Mine Area, Mercer County, North Dakota. Consol 3 Project. University of North Dakota. Grand Forks.
- Baukol-Noonan, Inc. 1980. Application for a Mining Permit—NE*. Oliver County, North Dakota.
- Brum, L. J., J. W. Enz and J. M. Ramirez. 1978. The implications of coal development on the atmospheric environment and plant ecosystems of selected sites in Western North Dakota (Climatology of Inversions): Final report to Surface, Environment and Mining (SEAM). U.S. Forest Service, Cooperative Agreement No. 16-418-GR. Department of Soils, NDSU Agricultural Experiment Station. 58 p.
- Croft, M. G. 1970. Ground Water Basic Data Mercer and Oliver Counties, North Dakota. U.S. Geological Survey Water, Resources Division. Bismarck.
- . 1973. Ground Water Resources Mercer and Oliver Counties, North Dakota. U.S. Geological Survey Water, Resources Division. Bismarck.
- Davis, L. B. 1977. Archaeological Photo Interpretation and Feasibility Study of a Five County Area in West Central North Dakota Using Small Scale (1:80,000) Aerial False Color Infrared. U.S. Bureau of Land Management. Dickinson.
- Dill, C. L. 1976. 1976 Archaeological and Historical Site Survey of Baukol-Noonan Incorporated's Center Mine, Limited and extended Mine Plan Areas. Oliver County. State Historical Society of North Dakota. Bismarck.
- . 1977. 1974-1976 Archaeological and Historical Site Survey of Consolidation Coal Company's Glenharold Mine, Limited and Extended Mine Plan Areas. Mercer County. State Historical Society of North Dakota. Bismarck.
- Farmer, T. R. et al. 1979. A Cultural Resource Inventory of the Glenharold Mine, Oliver County, North Dakota. Jackson, Commonwealth Associates Incorporated.
- Groenwald, G.H. and R.W. Rehm. 1980. Instability of Contoured Surface-Mined Landscapes in the Northern Great Plains: Causes and Implications, in Adequate Reclamation of Mined Lands? March 26-27. Paper No. 2:1-15. Billings, Montana.
- . et al. 1980. Potential Hydrogeochemical Impacts of Surface Mining in the Northern Great Plains. in Surface Mining Hydrology, Sedimentology, and Reclamation. University of Kentucky. Lexington.
- . 1979. Geology and Geohydrology of the Knife River Basin and Adjacent Areas of West Central North Dakota. North Dakota Geological Survey R.I. No. 64.
- Jensen, R. E. 1972. Climate of North Dakota. North Dakota State University. Fargo. 48 p.
- Manders, Charles. 1981. Personal Communication. Mandan City Planner.
- Mountain West Research. 1981. Computer Printouts Containing Population and Employment Forecasts. Unpublished.
- National Ambient Air Quality Standards. 1978. Title 40 CFR, Part 50.
- North Dakota Air Pollution Regulations. 1978. North Dakota Ambient Air Quality Standards. Chapter 33-15-02.
- North Dakota Crop & Livestock Reporting Service. 1980. North Dakota Agricultural Statistics, 1980. North Dakota State University, Agricultural Experiment Station and U.S. Department of Agricultural Economics, Statistics & Cooperative Service. Fargo.
- North Dakota Game and Fish Department, U.S. Bureau of Land Management, and U.S. Fish and Wildlife Service. 1981. Wildlife Unsuitability Criteria Application Report and Recommendations. Dickinson, North Dakota.
- North Dakota Public Service Commission, Reclamation and Siting Division. 1980. Rules and Regulations Adopted by North Dakota Effective August 1, 1980 Governing the Reclamation of Surface Mined Lands Under Chapter 38-14.1 of the North Dakota Century Code. Bismarck.
- Pedco Environmental, Inc. 1978. Survey of fugitive dust from coal mines.
- Prevention of Significant Deterioration of Air Quality. 1978. Chapter 33-15-15 NDAC.
- Power, J. F. et al. 1974. Can Productivity of Mined Land Be Restored in North Dakota? North Dakota Agricultural Experiment Station Farm Research 31:30-32.

SITE SPECIFIC ANALYSIS

- Ramirez, J. M. 1972. The agroclimatology of North Dakota, Part 1. Air temperature and growing degree days. Extension Bulletin No. 15. North Dakota State University. Fargo. 30 p.
- . 1973. The agroclimatology of North Dakota, Part 2. Precipitation: forecast probabilities and rainmaking. Extension Bulletin No. 16. North Dakota State University. Fargo. 44 p.
- . and T. Method. 1976. An air pollution climatology of a seven county area in Western North Dakota: Final report to North Dakota State Department of Health, Cooperative Agreement No. 2520-513-5120. Department of Soils, NDSU Experiment Station. 70 p.
- Requirements for Preparation, Adaption and Submittal of Implementation Plan. 1978. Title 40 CFR, Part 51.
- Shaver, J. C. 1977. North Dakota Rangeland Resources. Society for Range Management/Old West Regional Range Program. Bismarck.
- U. S. Dept. of Agriculture, Soil Conservation Service. 1971-80. Official Soil Series Descriptions. Government Printing Office. Washington, D.C.
- . 1975. Soil Survey of Oliver County, North Dakota.
- . 1978. Soil Survey of Mercer County, North Dakota.
- U. S. Dept. of Interior, Bureau of Land Management. Undated. Archaeological Site Forms. Unpublished. Dickinson, North Dakota.
- . 1981. June 1 Public Meeting with Mayor and Town Council Members of Center. North Dakota.
- . Undated. Mercer and Oliver Counties Unit Resource Analysis. Unpublished. Dickinson, North Dakota.
- U. S. Dept. of Commerce, National Climatic Center. Undated. STAR Data for Bismarck, North Dakota (1948-1974). Ashville, North Carolina.
- . 1973. Climatology of the United States No. 81. Ashville, North Carolina.
- . 1979 a and b. Climatological Data, annual summary, North Dakota. Ashville, North Carolina.
- U. S. Environmental Protection Agency. 1974. Development of emission factors for fugitive dust sources. EPA-450/3-74-037.
- . 1978. Mobile sources emission factors. EPA-400/9-78-005.
- . 1979. Compilation of air pollutant emission factors. AP-42.
- ., Region VIII. 1979. Interim policy paper on the air quality review of surface mine activities.
- Waldrun, Dave. 1981. Personal Communication. Lewis and Clark Regional Council Planner.
- Weston, T. et al. 1980. Cultural Resource Inventory of the Cross Ranch, Oliver County. University of North Dakota. Grand Forks.
- Wocken, W. C. 1981. Personal Communication. Planning Director, City of Bismarck, North Dakota.

SUMMARY MATRIX
CENTER TRACT
RESOURCE AND ENVIRONMENTAL CONSIDERATION

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Topography	Hilly with local relief.	Less contrasting topography with slight modification of drainage patterns.	Low	Good	
Geology and Minerals					
Geologic Hazards	None identified	None	N/A	Good	
Potential for Other Minerals	Low to Medium - This tract is located in the Williston Basin and has some potential for oil and gas.	Low to Moderate - There is ongoing exploration.	Mining could interfere with any future oil and gas development.		
Soils and Reclamation Potential					
Soil Erosion Potential	Wind - Low to mod. over most of the land above federal coal. Water - Mod to high over most of the land above federal coal.	Increases with soil handling operations but little overall change because of presence of dry land agricultural activity and mining.	Minimal	Outstanding	
Toxic Elements in Soil	No problems	None	None	There has not been a need for this data.	
Chemicals Corrosive to Metal or Concrete in Soil	Corrosivity of most soils to: Untreated steel - High; Concrete - Low.	None	None	Outstanding	

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Highly Saline/Sodic Soil Conditions	There are a few small, scattered areas of saline/sodic soils (35 acres).	These areas can possibly be improved by replacing with better plant growth material from surrounding soils and/or the overburden.	Minimal	Outstanding	
Character of Subsurface Materials and/or Interburden	There is a thin layer of glacial till over the residual shale, siltstone and sandstone in some areas. Core drill data tested for the Center Mine located within this tract indicates that some of the top 25 to 50 feet of overburden is often suitable for reconstructing soil profiles. Deeper layers of overburden often have high sodium, pH, and clay contents.	Some instability problems (settling, piping) may appear with the onset of reclamation. Some of the overburden could be used to improve areas with soils rated "poor" for final cover of surface-mined land.	Minimal	Outstanding	
Reclamation Potential					
	Based on soil suitability for final cover of surface mined land, the chance for successful reclamation of the land involved in this analysis appears to be high.			Outstanding	
	The breakdown of soil suitability totals from Table 2 are as follows: "Good" - 1388 acres, 51%; "Fair" - 976 acres, 36%; and "Poor" - 349 acres, 13%.				
	Precipitation could be a limiting factor for reestablishing vegetative cover some years.				

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Hydrology					
Degradation of Ground- water Quality	Shallow groundwater generally does not meet Public Health Service drinking water quality standards but is acceptable for domestic and stockwater	Groundwater quality will be degraded in the tract.	Between 3 and 6 wells used for domestic and stockwatering are located over federal coal and will be affected.	Hydrology - Good Well Inventory - Acceptable	These wells will pro- bably experience impacts from mining the private coal even if the federal coal is not leased.
Vegetation					
Cropland	There are 773 acres of land in the tract that are cur- rently being cropped.	Average annual loss of 46 acres excluding 168 total acres of summer fallow. Annual production on this 46 acres would be 1168 bu. of wheat. Maximum loss in any one peak mining year would be 456 acres and 11,582 bu. of wheat.	Moderate to high, de- pending upon individual operation. Low to moderate for overall tract produc- tion.	Good	
Rangeland	Average annual production is 888 AUMs.	Average annual loss of 53 AUMs. Each acre would be out of production from 10 to 15 years. Maximum loss for any one peak mining year would be 1047 acres and 524 AUM.	Moderate to high, de- pending upon individual operation. Low to moderate for overall tract.	Good	
Agriculture					
	There are six operators in the tract.	The same number of operators will be affected, to varying degrees, by a long- term but temporary loss of acreage for agricultural production.	Very significant to the operators involved.	Outstanding	
	25% of the involved operators' acreage is in the tract.				
	76% of the acreage in the tract is operated by lessees.	Nonowners will lose the use of their leased acreage with no compensation.	Significant to nonowners.	Outstanding	

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Threatened or Endangered Species	None	None	None	Good	
Land Use	Agriculture and mining dominate. The tract area surrounds the town of Center. State highway 48 and State highway 25 are partially within the tract. A cemetery, abandoned mines, minor roads, local power lines, and high voltage transmission lines.	Limited opportunities for expansion of Center in the short term. Displacement of agricultural use in the short term. Relocation or bypass of utilities and local roads.	Insignificant to moderately significant, dependent upon actual mining plan. See Vegetation/Agriculture sections. Short term inconvenience.	Acceptable	
Recreation Values	Less than 5% of tract used for recreation.	Loss of recreational areas and added stress on available recreational opportunities.	Limited recreational opportunities make impacts significant.	Good - Based on current studies.	
Aesthetics	Agriculture, mining, some unreclaimed. Aesthetic value moderate to low, scenic value low. Visible from the town of Center.	Loss of amenity where visible from Center and highways. May be considered part of the character of the landscape.	Moderately significant when aggregated with other coal development in short term. Insignificant in the long term.	Acceptable	

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Wildlife					
Sensitive Wildlife and Essential Habitats	Essential habitat for sensitive wildlife ranges from 63-80% of the areas for about 30 species. Whooping crane and northern swift fox are identified in the area.	Coal mining and attendant actions would severely disrupt and destroy locally significant wetlands interspersed with native prairie which singly and in composite constitute the essential habitats for 30 sensitive wildlife and many more common wildlife. Offsite aquatic habitats of Hagel and Square Butte Creeks, Missouri River would be recipients of potential point and non-point pollution.	There would be a significant area loss to wildlife resources if strip mining occurs in the essential wetland, woodlands, and native prairie.	1980 CIR aerial photo interpretation by Fish & Wildlife Service, Western Energy and Land Use Team. Unsuitability Criteria Application Team (FWS, NDGP & BLM biologists). Wildlife data quality is high.	To date there are no data to direct successful re-creation (compensation) of native woodlands and wetlands after strip mining in this country. Native prairie comprised of native plant species has not been recreated from mine spoil. If some form of habitat replacement is achieved during mining and thereafter, then the negative impacts to wildlife resources would be proportional to the successful compensation.
General					Increased poaching and disturbance would significantly reduce all wildlife populations in the region. If not controlled, it would significantly reduce recreation opportunities.

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Cultural/ Historical Values	Sample surveys are complete. Recorded cultural resources will not affect coal mining.	Loss of sites as a result of mining activity.	Anticipated impact is not great because resources can be mitigated through data recovery.	Good	None
Net Energy Analysis	The Center Mine produced 3.72 million tons of lignite in 1980.	The annual total production will reach 4.2 million tons by 1995.	Production: 6747 Btu/lb. of coal Consumption: 37.7 Btu/lb of coal Ratio of consumption to production: 179.0 Btu: 1 Btu	Acceptable	
Climate and Air Quality	Good	Totally consumes the allow- able class II PSD 24-hour increment for particulates.	Significant	Fair	Any associated PSD source could not con- tribute significantly (5 ug/m ³ - 24-hour) to the PSD's class II 24-hour particulates increment.

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Social and Economic Considerations					
Employment	Community services generally adequate for current employment site.	Very small if any increase in employment.	Insignificant	Acceptable	
Population	Community services generally adequate for current population.	Very small if any increase in population.	Insignificant	Acceptable	
Regional Income	\$4560 estimated regional income per capita.	Very small if any increase in regional income per capita.	Insignificant	Acceptable	
Infrastructure Assessment (Community Services)	Most community services generally adequate; often with one or two inadequate services.	No change in community service adequacy.	Insignificant	Acceptable	

CENTER TRACT
UNSUITABILITY CRITERIA RESULTS

Criterion	Applicable to Tract	Exception Used (if applicable)	Additional Data Needed	Comments
1. Federal land system	No	---	No	---
2. Rights-of way and easements	No	---	No	---
3. Buffer zones	Yes	No	None	Exceptions may be applied at mine plan.
4. Wilderness study areas	No	---	No	---
5. Scenic areas	No	---	No	---
40 6. Land used for scientific studies	No	---	No	---
7. Historic lands and sites	No	---	No	---
8. Natural areas	No	---	No	---
9. Federally listed endangered species	Whooping crane and northern swift fox known or believed to use this region.	---	Swift fox data limited	Exclusion of strip mining from wetlands would protect most whooping crane areas.
10. State listed	No	---	No	Does not exist.
11. Eagle nests	No	---	No	---
12. Eagle roosts and concentration areas	No	---	No	---

Criterion	Applicable to Tract	Exception Used (if applicable)	Additional Data Needed	Comments
13. Falcon cliff-nesting sites	No	---	No	---
14. Migratory birds	Yes	Yes, interagency team applied exceptions as suitable for mining with stipulations.	---	Seven species in combination with Criterion 15.
15. State resident fish and wildlife	Yes	Yes, interagency team applied exceptions as suitable for mining with stipulations.	---	About 30 species in combination with Criterion 14.
16. Flood plains	No	---	No	---
17. Municipal watersheds	No	---	No	---
18. National resource waters	No	---	No	---
19. Alluvial valley floors	No	---	No	---
20. State proposed criteria	No	---	No	None





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